Who We Are and What We Do

- The mission of the National Science Foundation (NSF) is to promote the progress of science; to advance the national health, prosperity, and welfare; and to secure the national defense.

- NSF's vision is a nation that creates and exploits new concepts in science and engineering and provides global leadership in research and education.

- NSF supports research and workforce development programs that help drive future economic growth, global competitiveness, and the creation of high-wage jobs for American workers.

- NSF seeks high-risk, potentially transformative projects that will generate pathbreaking discoveries and new technologies.

- NSF funds advanced instrumentation and facilities that enable state-of-the-art research, Arctic and Antarctic research and operations, and cooperative research between universities and industry as well as United States participation in international scientific efforts.

NSF BY THE NUMBERS	
$7.2 billion	FY 2014 appropriations (does not include mandatory accounts)
1,826	Colleges, universities, and other institutions receiving NSF funding in FY 2014
48,100	Proposals evaluated in FY 2014 through a competitive merit review process
11,000	Competitive awards funded in FY 2014
225,800	Proposal reviews conducted in FY 2014
320,900	Estimated number of people NSF supported directly in FY 2014 (researchers, postdoctoral fellows, trainees, teachers, and students)
49,800	Students supported by NSF Graduate Research Fellowships since 1952

From the Director

Credit: NSF/Sandy Schaeffer

I am pleased to present the third of the three reports NSF prepares each year to demonstrate accountability to our stakeholders and the American people. NSF's research and workforce development programs help lay the foundation for economic growth by building an innovation economy and educating globally-competitive American workers. By advancing the frontiers of science and engineering, our nation can develop the knowledge and innovative technologies needed to address the challenges we face. For more than 60 years, NSF's investments in science and engineering have led to important innovations that have spurred economic prosperity, increased our quality of life, and enhanced national security.

Breakthrough research supported by NSF in FY 2014 accessed previously unseen phenomena. These include the motion of a single molecule in real time and neutrinos from the sun's core. Researchers looking skyward produced maps of the Milky Way's interstellar material and found the smallest known galaxy harboring a supermassive black hole. Those focused on Planet Earth identified two new dinosaur species and found that bird migrations follow areas of new plant growth—a "green wave" of

travel. As NSF in 2014 continued to contribute significantly to the Administration's Brain Research through Advancing Innovative Neurotechnologies initiative (BRAIN), NSF-supported researchers made advances in other large arenas as well, including cloud computing and data-driven discovery.

This report includes a summary of information on NSF's performance for the last year. As is noted, in FY 2014, NSF achieved 8 of 10 performance goals, and made progress in all 3 priority goals. All performance data have been independently verified and validated using guidelines for completeness and reliability from the Government Accountability Office. NSF's *Annual Performance Report* contains a discussion of NSF's data validation, including any limitations, and progress toward its annual performance goals.

To learn more about NSF and the exciting results from our investments in science and engineering research and education I refer you to NSF's *FY 2014 Agency Financial Report* and NSF's website at *www.nsf.gov*.
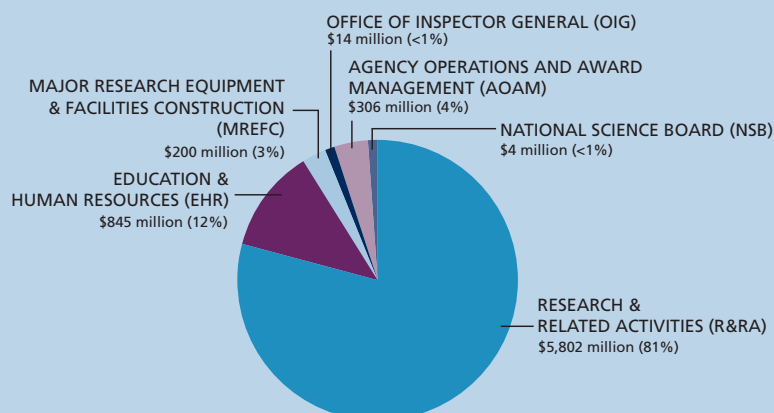
France A. Córdova

February 12, 2015

Following the Money

WHERE IT COMES FROM
FY 2014 Appropriations by Account—$7,172 million

OFFICE OF INSPECTOR GENERAL (OIG)
$14 million (<1%)

AGENCY OPERATIONS AND AWARD
MANAGEMENT (AOAM)
$306 million (4%)

NATIONAL SCIENCE BOARD (NSB)
$4 million (<1%)

MAJOR RESEARCH EQUIPMENT
& FACILITIES CONSTRUCTION
(MREFC)
$200 million (3%)

EDUCATION &
HUMAN RESOURCES (EHR)
$845 million (12%)

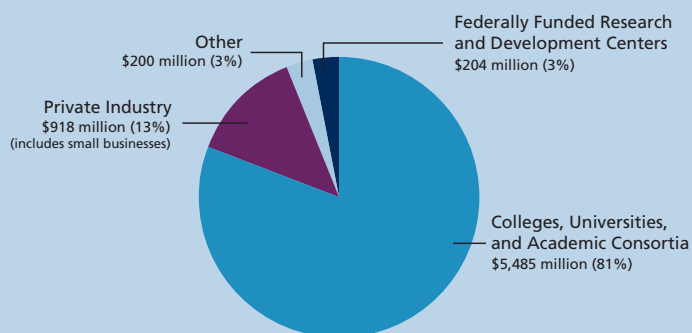RESEARCH &
RELATED ACTIVITIES (R&RA)
$5,802 million (81%)

Note: Agency Operations and Award Management includes transfers of $7.2 million from the Research and Related Activities account and $1.1 million from the Education and Human Resources account. Office of Inspector General includes a transfer of $84,000 from the Research and Related Activities account. These transfers were authorized by P.L. 113-76, *Consolidated Appropriations Act, 2014*. Totals may not add due to rounding.

WHERE IT GOES
INSTITUTIONS FUNDED BY NSF
FY 2014 Obligations for Research and Education Programs ($6,807 million)

Other
$200 million (3%)

Federally Funded Research
and Development Centers
$204 million (3%)

Private Industry
$918 million (13%)
(includes small businesses)

Colleges, Universities,
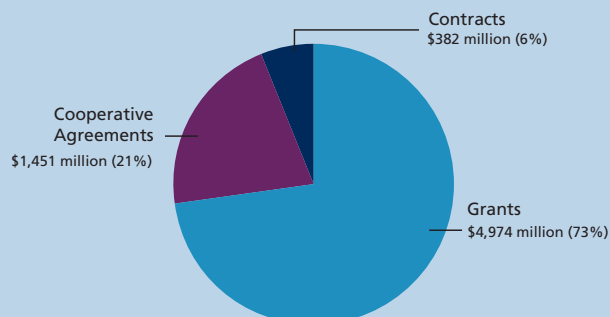and Academic Consortia
$5,485 million (81%)

Note: NSF Research and Education Programs include Research and Related Activities, Education and Human Resources, and Major Research Equipment and Facilities Construction appropriations. Other institutions funded include federal, state, and local governments; nonprofit organizations; and international organizations. Totals may not add due to rounding.

HOW IT GETS THERE
NSF AWARD MECHANISMS
FY 2014 Obligations for Research and Education Programs ($6,807 million)

Contracts
$382 million (6%)

Cooperative
Agreements
$1,451 million (21%)

Grants
$4,974 million (73%)

Note: NSF Research and Education Programs include Research and Related Activities, Education and Human Resources, and Major Research Equipment and Facilities Construction appropriations. Totals may not add due to rounding.

- NSF is funded primarily through six congressional appropriations, which totaled $7,172 million in FY 2014. R&RA, EHR, and MREFC fund the agency's programmatic activities and account for 95 percent of NSF's total appropriations. The AOAM appropriation provides funds to administer and manage those programmatic activities. Separate appropriations are provided to support the activities of the OIG and NSB.
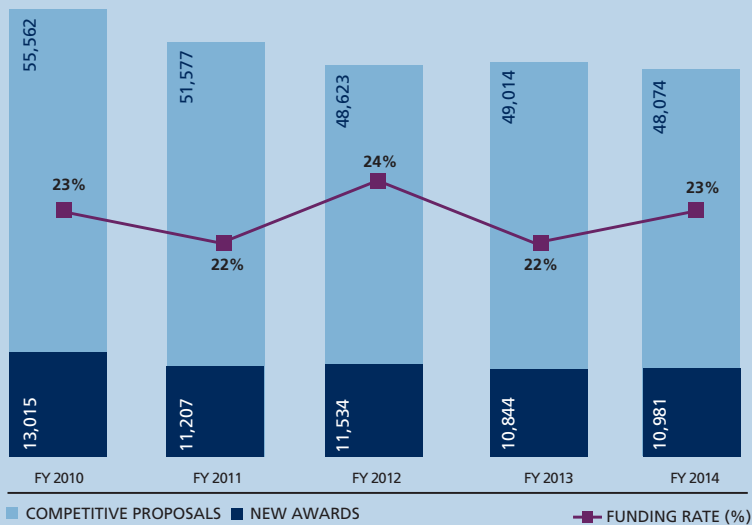
- In FY 2014, 89 percent of research funding was allocated based on competitive merit review. About 35,000 members of the science and engineering community participated in the merit review process as panelists and proposal reviewers. Awards were made to 1,826 institutions in 50 states, the District of Columbia, and 4 U.S. territories. These institutions employ America's leading scientists, engineers, and educators and train the leading-edge innovators of tomorrow.

- Eighty-one percent of NSF awards were to academic institutions, including colleges, universities, and academic consortia. Awards were also provided to federally funded research and development centers and private industry, including small businesses. Other recipients include federal, state, and local governments; nonprofit organizations; and international organizations. A small number of awards are for international research collaborations that add value to the U.S. scientific enterprise.
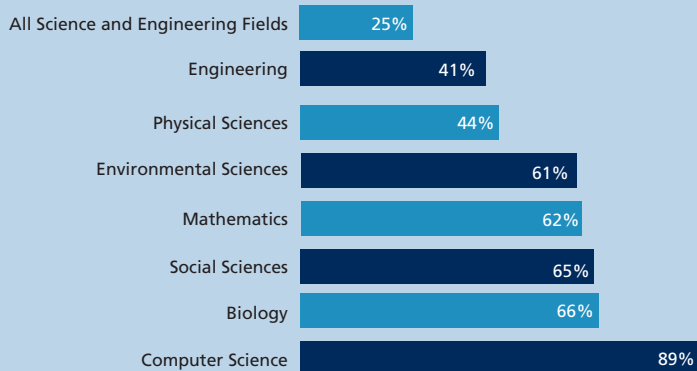
- Most NSF awards (94 percent) were funded through grants or cooperative agreements. Grants can be funded either as standard awards, in which funding for the full duration of the project is provided in a single fiscal year, or as continuing awards, in which funding for a multi-year project is provided in increments. Cooperative agreements are used when the project requires substantial agency involvement (e.g., research centers, multi-use facilities). Contracts are used to acquire products, services, and studies (e.g., program evaluations) required primarily for NSF or other government use.

HOW IT'S SPENT
NUMBER OF NSF COMPETITIVE PROPOSALS, NEW AWARDS, AND FUNDING RATES

	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014
Competitive Proposals	55,562	51,577	48,623	49,014	48,074
New Awards	13,015	11,207	11,534	10,844	10,981
Funding Rate (%)	23%	22%	24%	22%	23%

COMPETITIVE PROPOSALS ■ NEW AWARDS ■ FUNDING RATE (%)

NSF SUPPORT OF ACADEMIC BASIC RESEARCH IN SELECTED FIELDS
(as a percentage of total federal support)

Field	Percentage
All Science and Engineering Fields	25%
Engineering	41%
Physical Sciences	44%
Environmental Sciences	61%
Mathematics	62%
Social Sciences	65%
Biology	66%
Computer Science	89%

Note: Biology includes Biological Sciences and Environmental Biology; excludes National Institutes of Health.

Source: NSF/National Center for Science and Engineering Statistics, Survey of Federal Funds for Research & Development, FY 2013.

- In FY 2014, the number of competititive proposals reviewed by NSF dropped nearly 2 percent—a decrease of 940, to 48,074. The decrease in competitive proposals reflects changes such as the consolidation of programs into one with a short proposal period and the movement and elimination of proposal deadlines.

- The number of new awards increased in FY 2014, by 1.3 percent (137) to 10,981. The increase in new award actions coupled with a 2 percent decrease in the number of competitive proposals resulted in a 1 percentage point increase in the funding rate, to 23 percent.

- It is estimated that in FY 2014, 320,900 people were directly involved in NSF programs and activities, receiving salaries, stipends, or participant support. Beyond this, NSF programs indirectly impact millions of people. These programs reach K-12 students and teachers, the general public, and researchers through activities including workshops; informal science activities such as museums, television, videos, and journals; outreach efforts; and dissemination of improved curriculum and teaching methods.

- NSF accounts for 25 percent of the total federal budget for basic research conducted at U.S. colleges and universities, and this share increases to 60 percent when medical research supported by the National Institutes of Health is excluded. In many fields NSF is the primary source of federal academic support.

FY 2014 FINANCIAL MANAGEMENT PERFORMANCE RESULTS

	RESULTS
Financial Statement Audit* • Unmodified opinion (17th consecutive "clean" opinion) • Material weaknesses	Yes None
Summary of Management Assurances • Effective internal control over financial reporting (FMFIA §2) • Effective internal control over operations (FMFIA §2) • Conformance with financial management system requirements (FMFIA §4) • Compliance with Section 803(a) of FFMIA: system requirements, accounting standards, and U.S. General Ledger at transaction level	Yes Yes Yes No lack of substantial compliance noted
Improper Payments Elimination and Recovery Act of 2010	Partial compliance**
Number of grant payments processed in FY 2014	27,978

*NSF's FY 2014 Independent Auditors' Report can be found in NSF's *FY 2014 Agency Financial Report*.
**Risk assessment was completed; for more information see NSF's *FY 2014 Agency Financial Report*, Appendix 2.
FMFIA: Federal Managers Financial Integrity Act of 1982
FFMIA: Federal Financial Management Improvement Act of 1996

How We Are Doing: Performance Results

In FY 2014, NSF published a new strategic plan, performed its first round of strategic reviews, and set new priority goals, in addition to continuing its longstanding monitoring of performance goals.

- The new strategic plan, *Investing in Science, Engineering, and Education for the Nation's Future: NSF Strategic Plan for 2014 – 2018*, outlines 3 strategic goals and 7 objectives, which are comprehensive of agency program activities. The objectives underwent their first annual strategic review in FY 2014.
- NSF also set 3 agency priority goals (APGs) for achievement in FY 2015. APGs monitor progress in specific areas where near-term focus on agency execution can have the most impact.
- NSF tracked progress toward its 3 strategic goals using 10 performance goals and three priority goals. Of the 10 goals with targets in FY 2014, 8 were achieved and one was partially achieved.

NSF's *FY 2014 Annual Performance Report* (APR) in the *FY 2016 Budget Request to Congress* provides a full description of the strategic review process and of all the agency's performance measures, including descriptions of the metrics, methodologies, results, and trends, along with a list of relevant external reviews.

GOAL TYPE	STRATEGIC GOAL	STRATEGIC OBJECTIVE	FY 2014 STRATEGIC REVIEW RATING
Mission-oriented	Transform the Frontiers of Science and Engineering	Invest in fundamental research to ensure significant continuing advances across science, engineering, and education.	Noteworthy progress
		Integrate education and research to support development of a diverse STEM workforce with cutting-edge capabilities.	Not rated
		Provide world-class research infrastructure to enable major scientific advances.	Not rated
	Stimulate Innovation and Address Societal Needs Through Research and Education	Strengthen the links between fundamental research and societal needs through investments and partnerships.	Noteworthy progress
		Build the capacity of the nation to address societal challenges using a suite of formal, informal, and broadly available STEM educational mechanisms.	Not rated
Management	Excel as a Federal Science Agency	Build an increasingly diverse, engaged, and high-performing workforce by fostering excellence in recruitment, training, leadership, and management of human capital.	Focus area for improvement
		Use effective methods and innovative solutions to achieve excellence in accomplishing the agency's mission.	Not rated

FY 2014 PERFORMANCE GOAL	RESULT
1. Agency Priority Goal: Ensure Public Access to Publications. By September 30, 2015, NSF-funded investigators will be able to deposit versions of their peer-reviewed articles in a repository to make them available to the public within 1 year of publication.	Progress made. No FY 2014 targets.
2. Agency Priority Goal: Increase Data Scientists and Data Infrastructure. By September 30, 2015, implement mechanisms to support the training and workforce development of future data scientists; increase the number of multi-stakeholder partnerships to address the nation's big data challenges; and increase investments in current and future data infrastructure extending data-intensive science into more research communities.	
3. Agency Priority Goal: Optimize the Award Process to Level Workload. By September 30, 2015, meet targets to level distribution of awards across the fiscal year and subsequently improve awardee capacity to effectively manage research funding.	
4. Meet critical targets for key FY 2014 program investments.	Partially Achieved
5. Establish an NSF-wide undergraduate STEM education program that is evidence-based and evidence-building.	Achieved
6. Enhance the Graduate Research Fellowship program to provide a wider range of career development opportunities.	Achieved
7. Promote policies and practices that support more fully utilizing the talents of individuals in all sectors of the American population, principally women, underrepresented minorities, and persons with disabilities.	Achieved
8. Ensure program integrity and responsible stewardship of major research facilities and infrastructure.	Achieved
9. Foster an environment of diversity and inclusion while ensuring compliance with the agency's civil rights programs.	Not achieved
10. Use evidence-based reviews to guide management investments.	Achieved
11. Upgrade NSF's financial system.	Achieved
12. Inform applicants whether their proposals have been declined or recommended for funding within 182 days, or 6 months, of deadline, target, or receipt date, whichever is later.	Achieved
13. Improve the ability to use virtual merit review panels by incorporating technological innovations into the review process.	Achieved

STEM: Science, Technology, Engineering, and Mathematics. All performance data have been independently verified and validated. Data limitations were found for Goals 4, 6, and 10; for more information see NSF's *FY 2014 APR*.

Management Challenges

For FY 2014, the NSF Office of Inspector General (OIG) identified nine management and performance challenges facing the agency:

- Establishing accountability over large cooperative agreements
- Improving grant administration
- Strengthening contract administration
- Managing the U.S. Antarctic Program
- Moving NSF headquarters to a new building
- Managing programs and resources in times of budgetary austerity
- Ensuring proper stewardship of American Recovery and Reinvestment Act funds
- Encouraging the ethical conduct of research
- Implementing a new financial management system

OIG's memorandum on FY 2014 Management Challenges can be found in NSF's *FY 2013 Agency Financial Report*. Management's report on the significant activities undertaken in FY 2014 to address these challenges is included in NSF's *FY 2014 Agency Financial Report*.

For more information

NSF Budget and Performance website
www.nsf.gov/about/performance

NSF FY 2014 Agency Financial Report
www.nsf.gov/publications/pub_summ.jsp?ods_key=afr

NSF FY 2014 Annual Performance Report
See Performance chapter of NSF FY 2016 Budget Request to Congress www.nsf.gov/about/performance.

Report to the National Science Board on NSF's Merit Review Process FY 2013
www.nsf.gov/nsb/publications/2014/nsb1432.pdf

NSF Research and Education Highlights and Discoveries
www.nsf.gov/discoveries

NSF FY 2014 Progress Report on OIG Management Challenges
www.nsf.gov/publications/pub_summ.jsp?ods_key=afr
(See Appendix 3B)

Investing in Science, Engineering, and Education for the Nation's Future, NSF Strategic Plan for 2014-2018
www.nsf.gov/about/performance/strategic_plan.jsp

FY 2014 NSF Senior Management

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France A. Córdova, Director
Richard O. Buckius,
Chief Operating Officer

National Science Board
Dan E. Arvizu, Chair
Kelvin K. Droegemeier, Vice Chair

Directorate for Biological Sciences
John C. Wingfield, Assistant Director

Directorate for Computer and Information Science and Engineering
Farnum Jahanian, Assistant Director

Directorate for Education and Human Resources
Joan Ferrini-Mundy, Assistant Director

Directorate for Engineering
Pramod P. Khargonekar, Assistant Director

Directorate for Geosciences
Roger M. Wakimoto, Assistant Director

Directorate for Mathematical and Physical Sciences
F. Fleming Crim, Assistant Director

Directorate for Social, Behavioral and Economic Sciences
Joanne Tornow, Assistant Director (Acting)

Office of Diversity and Inclusion
Claudia J. Postell, Office Head

Office of the General Counsel
Lawrence Rudolph, General Counsel

Office of Inspector General
Allison C. Lerner, Inspector General

Office of International and Integrative Activities
Wanda Ward, Office Head

Office of Legislative and Public Affairs
Judith Gan, Office Head

Office of Budget, Finance and Award Management
Martha A. Rubenstein, Office Head

Office of Information and Resource Management
Clifford J. Gabriel, Office Head (Acting)

NSF Officers

Chief Financial Officer
Martha A. Rubenstein (Office of Budget, Finance and Award Management)

Chief Human Capital Officer
Judith S. Sunley, Acting (Office of Information and Resource Management)

Chief Technology Officer
José Muñoz

Chief Information Officer
Amy Northcutt (Office of Information and Resource Management)

NSF Affirmative Action Officer
Claudia J. Postell (Office of Diversity and Inclusion)

National Science Board Members in FY 2014

Dan E. Arvizu, *Chair*
National Renewable Energy Laboratory

Kelvin K. Droegemeier, *Vice Chair*
University of Oklahoma

John Anderson[1]
Illinois Institute of Technology

Deborah L. Ball
University of Michigan

Bonnie L. Bassler
Princeton University

Roger N. Beachy[1]
University of California, Davis

Arthur Bienenstock
Stanford University

Ray M. Bowen[2]
Texas A&M University

Vinton G. Cerf
Google Incorporated

Vicki Chandler[1]
Gordon and Betty Moore Foundation

France A. Córdova[2]
Purdue University

Ruth A. David
Analytic Services Incorporated

Inez Y. Fung
University of California, Berkeley

Robert M. Groves[1]
Georgetown University

Esin Gulari[2]
Clemson University

James S. Jackson[1]
University of Michigan

G. Peter Lepage
Cornell University

Alan I. Leshner
American Association for the Advancement of Science

W. Carl Lineberger
University of Colorado

Stephen L. Mayo
California Institute of Technology

Sethuraman Panchanathan[1]
Arizona State University

G.P. "Bud" Peterson
Georgia Institute of Technology

Douglas D. Randall[2]
University of Missouri

Geraldine L. Richmond
University of Oregon

Anneila I. Sargent
California Institute of Technology

Diane L. Souvaine
Tufts University

Arnold F. Stancell[2]
Georgia Institute of Technology

Claude M. Steele[2]
Stanford University

Robert J. Zimmer
University of Chicago

Maria T. Zuber
Massachusetts Institute of Technology

Member *ex officio:*
France A. Córdova
National Science Foundation

Michael L. Van Woert
Executive Officer and Director
National Science Board Office

[1]Appointment effective on July 7, 2014.
[2]Appointment ended on May 10, 2014.

Research and Education Highlights

Blue Waters: One of the most powerful supercomputers in the world and a major advance in U.S. research infrastructure, Blue Waters enables researchers to tackle simulation problems in astronomy, physics, chemistry, engineering, and other fields that less powerful computing systems simply can't handle. Blue Waters also helps researchers drill down into massive quantities of data, a capability essential to realizing the promise of personalized medicine and understanding trends in massive datasets from environmental observations. Teams from across the nation will use Blue Waters to investigate a broad range of phenomena including the fundamental nature of matter and energy, the development of new materials, the effects of earthquakes, and the evolution of the universe.


Credit: NCSA/University of Illinois

Bionic Suit: The 2014 World Cup kickoff was like no other. A paraplegic volunteer did the ceremonial first kick, wearing an exoskeleton that took cues from his brain activity. The exoskeleton used computer algorithms to detect the brain signals of the kicker, who was wearing an EEG cap. The research began nearly 2 decades ago with an NSF grant to Duke University neurobiologist Miguel Nicolelis for research into how neurons in the cerebral cortex are involved in motor learning.
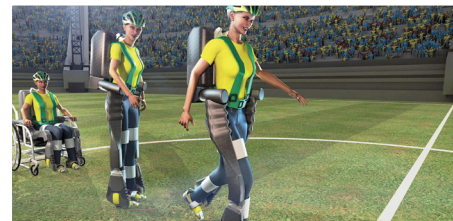
Credit: NSF

New Media Model: "Plum Landing," created by WGBH in Boston, uses animations, games, a mobile app, videos, and hands-on activities to increase children's understanding of science and nature. Designed for kids aged 6 to 9, it introduces core science concepts and models key habits that scientists use when exploring the natural world. Since its debut last April, the website has garnered 8 million+ page views. Children also are exploring their environments—to date, they've submitted 70,000 photos and drawings.
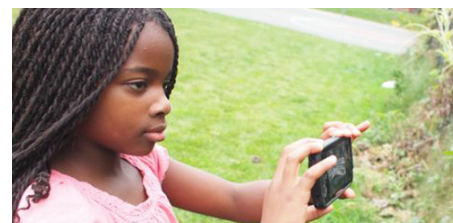

Credit: © Bill Shribman

Non-Contact Detection of Explosive Materials: In research relevant to homeland security and antiterrorism efforts, Cornell University researchers created an ultrasensitive polymer that uses fluorescence to detect explosives not only on surfaces but in the air. Currently, to identify explosive ingredients, airport security officers run a swab over a suspected object prior to analysis.

Credit: Deepti Gopalakrishnan and William Dichtel

Memory Making and Protein: Researchers discovered that the Arc gene and its protein product, also called Arc, play an essential role in memory formation. One of tens of thousands of proteins in the brain, Arc is found in the brain's hippocampus region (the area involved in many forms of learning), and activates as memories form. Knowing how a healthy brain forms memories is an important step to understanding what goes wrong in a range of memory disorders including Alzheimer's disease and stroke.
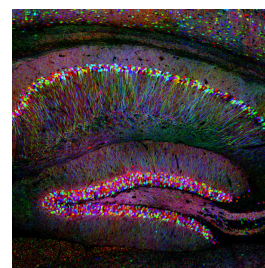
Credit: Jean Livet, Institut de la Vision, Paris; Jeff Lichtman and Joshua Sanes, Harvard University

Seeing-Eye Robot: At the University of Arkansas at Little Rock, researchers prototyped a robotic walking stick for the blind. It has cameras to detect objects in the way such as chairs and stairs, an audio system that communicates to the user, and a computer that remembers recent pathways and objects in them. This project was developed under the National Robotics Initiative, a multi-agency program led by NSF.

Credit: Dr. Cang Ye, University of Arkansas at Little Rock

NSF–15–004